UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,832	11/21/2003	Y. Long He	10559-583002	1330

20985 7590 05/04/2006

FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER	
LUND, JEFFRIE ROBERT	
ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 05/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/718,832	HE ET AL.	
	Examiner	Art Unit	
	Jeffrie R. Lund	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *24,25 and 27-43* is/are pending in the application.

4a) Of the above claim(s) *32-41* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *24,25,27-31,42 and 43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 24, 25, 27-31, 42, and 43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are directed to an apparatus and include process or method limitations such as: "wherein the first and second plasmas have a specified ratio such that a combination of the first and second plasmas etch the quartz plate in which the rate of etching across the quartz plate is within 1% of the rate of etching at the central portion of the quartz plate" (claim 24); the amounts of the first and second plasmas having a specified ratio such that a combination of the first and second plasmas etch the substrate in the chamber in which the rate of etching across the substrate is within 1% of the rate of etching at a central portion of the substrate" (claim 27); or "the rate of etching at a peripheral portion of the surface is within 1% of the rate of etching at a central portion of the surface" (claim 42 and 43). These process limitations render the claims indefinite in that the combination of two separate statutory classes of invention, a manufacturer or seller of the claimed apparatus would not know from the claim whether it might also be liable for contributory infringement because a buyer or user of the apparatus later performs the claimed method of using the apparatus. Thus the claims are not sufficiently precise to provide competitors with an accurate determination of the

metes and bounds of the protection involve, and are ambiguous. (See 77USPQ2D 1140, *IPXL Holdings LLC v. Amazon.com Inc.*)

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 27-31, 42, and 43 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jucha et al, US Patent 4,874,723.

Jucha et al teaches a plasma etching apparatus that includes: a chamber 1306; a support 1320 for supporting a wafer (plate) 48; a first high frequency source attached to an electrode 1314; a second high frequency source attached to a remote plasma generator 1326; an inlet structure 1304, 1322; mass flow controllers connected to each gas inlet to control the amount and concentration of the gases supplied to the chamber and controlled by a control system 206. Jucha et al also teaches forming mixed gas plasma containing SF_6 and CF_4. (Entire document, specifically, figure 32, column 51

lines 36-41; and column 64 line 48-51)

The specific ratio of the plasmas formed from SF_6 and CF_4 is an intended use of the apparatus. The apparatus of Jucha et al is capable of forming such a mix of plasmas such that the rate of etching across the substrate is within 1% of the rate of etching at the central portion of the substrate. Furthermore, it has been held that: claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danley*, 120 USPQ 528, 531, (CCPQ 1959); "Apparatus claims cover what a device is, not what a device does" (Emphasis in original) *Hewlett-Packard Co. V. Bausch & Lomb Inc.*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990); and a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus " if the prior art apparatus teaches all the structural limitations of the claim *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Also see MPEP 2114.

Alternately, if the ratio of the plasmas is held not to be an inherent intended use of the apparatus of Jucha et al, then it would had been obvious to one of ordinary skill in the art at the time of the invention was made to use the optimum ratio of SF_6 and CF_4 plasmas to uniformly etch the substrate.

5. Claims 24 and 25 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jucha et al, US Patent 4,874,723.

Jucha et al teaches a plasma etching apparatus that includes: a chamber 1306; a support 1320 for supporting a wafer (plate) 48; a first high frequency source attached to an electrode 1314; a second high frequency source attached to a remote plasma

generator 1326; an inlet structure 1304, 1322; mass flow controllers connected to each gas inlet to control the amount and concentration of the gases supplied to the chamber and controlled by a control system 206. Jucha et al also teaches forming mixed gas plasma containing SF_6 and CF_4. (Entire document, specifically, figure 32, column 51 lines 36-41; and column 64 line 48-51)

The specific ratio of the plasmas formed from SF_6 and CF_4 is an intended use of the apparatus. The apparatus of Jucha et al is capable of forming such a mix of plasmas such that the rate of etching across the substrate is within 1% of the rate of etching at the central portion of the substrate. Furthermore, it has been held that: claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danley*, 120 USPQ 528, 531, (CCPQ 1959); "Apparatus claims cover what a device is, not what a device does" (Emphasis in original) *Hewlett-Packard Co. V. Bausch & Lomb Inc.*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990); and a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus " if the prior art apparatus teaches all the structural limitations of the claim *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Also see MPEP 2114.

The specific type of substrate (i.e. quartz) worked on is an intended use the apparatus. This rejection is based on the fact that the apparatus structure of Jucha et al is capable of working on (i.e. processing) a quartz substrate, as intended by the Applicant. It has also been held that "Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability

of the apparatus claim." *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, "Inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims." *In re Young*, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). See MPEP 2115.

Alternately, if the ratio of the plasmas and the specific type of substrate treated is held not to be an inherent intended use of the apparatus of Jucha et al, then it would had been obvious to one of ordinary skill in the art at the time of the invention was made to etch a quartz substrate using the optimum ratio of SF_6 and CF_4 to uniformly etch the substrate.

6. Claims 24, 25, 27-31, 42, and 43 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Applicants disclosed prior art.

After describing the apparatus found in Figure 1 the applicant further discloses that "A suitable plasma chamber apparatus is available as model VRL-ME-II-M-QTZ from Unaxis, St. Petersberg, Florida." (See the specification page 4 lines 13-15) The specific process performed on the specific type of substrate is an intended use of the apparatus. The apparatus disclosed by the Applicant can perform the desired process on the desired substrate as indicated by the Applicant.

7. Claims 24, 25, 27-31, 42 and 43 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hongoh, US Patent 6,343,565 B1.

Hongoh teaches a plasma processing apparatus that includes: a chamber S; a support 24 for supporting a wafer (plate) W; a high frequency source 76; and an inlet

structure comprising a first gas supply 54 connected to a first inlet 38 via a first flow controller 46, and a second gas supply 56 connected to a second inlet 40 via a second flow controller 48. (Figure 5)

The particular type of gas used to form a specific plasma is a process limitation rather than an apparatus limitation, and the recitation of a particular type of plasma does not so limit an apparatus claim. This rejection is based on the fact that the apparatus of Hongoh is capable of supplying the desired gases at the desired ratio to form the desired ratio of plasmas such that the rate of etching across the substrate is within 1% of the rate of etching at the central portion of the substrate intended by the Applicant. Furthermore, it has been held that: claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danley*, 120 USPQ 528, 531, (CCPQ 1959); "Apparatus claims cover what a device is, not what a device does" (Emphasis in original) *Hewlett-Packard Co. V. Bausch & Lomb Inc.*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990); and a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus " if the prior art apparatus teaches all the structural limitations of the claim *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Also see MPEP 2114.

The specific type of substrate (i.e. quartz) worked on (i.e. etched) is an intended use the apparatus. This rejection is based on the fact that the apparatus structure of Hongoh is capable of working on (i.e. processing) a quartz substrate, as intended by the Applicant. It has also been held that "Expressions relating the apparatus to contents

thereof during an intended operation are of no significance in determining patentability of the apparatus claim." *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, "Inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims." *In re Young*, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Also see MPEP 2115.

The only structural limitations claimed is a chamber in which a plasma containing multiple gases is formed and a flow controller to control the flow of the plasma gases. Hongoh teaches such a chamber.

Claims 29-31 deal directly with how the apparatus is used. The limitations are specifically connected to the type of gases supplied and the specific mixture of these gases. The Examiner can find no structure taught by the applicant that directs or controls the gases to achieve these process limitations (i.e. showerhead, baffle) other than the generic gas inlet system. If fact, the only way to achieve these process limitations taught by the Applicant is to us known mass flow controllers to control the mixture or ratio of the gases delivered to a known apparatus.

Alternately, if the type of plasma formed in the chamber and type of substrate treated are held not to be inherent in the functions of the apparatus of Hongoh, it would have been obvious to one of ordinary skill in the art at the time the invention was made to supply the desired gases in the desired amounts to the apparatus of Hongoh to form the desired plasma and to use the desired plasma to treat the desired substrate.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jucha et al, 4,874,723 in view of Oda et al, Journal of Vacuum Science & Technology (Nov.-Dec. 1996) vol. 14, no. 6, p. 4366-70 "X-ray mask fabrication technology for 0.1μm very large scale integrated circuits".

Jucha et al was discussed above.

Jucha et al differs from the present invention in that Jucha et al does not teach etching a quartz substrate with SF_6 and CF_4 such that the rate of etching across the substrate is within 1% of the rate of etching at the central portion of the substrate.

Oda et al teaches etching a quartz substrate with SF_6 and CF_4. (See section III. B. on pages 4367-68)

The motivation for etching a quartz substrate with a mixture SF_6 and CF_4 in the apparatus of Jucha et al is to provide an etching apparatus in which to carry out the etching process taught by Oda et al.

The motivation for optimizing the mixture of gases such that the ratio of plasmas results in an etching rate across the substrate within 1% of the rate of etching at the central portion of the substrate is to improve the uniformity of the etching process which results in a more uniformly etched substrate as taught by Oda et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the etching method of Oda et al in the apparatus of

Jucha et al.

10. Claims 24, 25, 27-31, 42, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hongoh, 6,343,565 B1 in view of Oda et al, Journal of Vacuum Science & Technology (Nov.-Dec. 1996) vol. 14, no. 6, p. 4366-70 "X-ray mask fabrication technology for 0.1μm very large scale integrated circuits".

Hongoh was discussed above.

Hongoh differs from the present invention in that Hongoh does not teach etching a quartz substrate with SF_6 and CF_4 such that the rate of etching across the substrate is within 1% of the rate of etching at the central portion of the substrate

Oda et al teaches etching a quartz substrate with SF_6 and CF_4. (See section III. B. on pages 4367-68)

The motivation for etching a quartz substrate with a mixture SF_6 and CF_4 in the apparatus of Hongoh is to provide an etching apparatus in which to carry out the etching process taught by Oda et al.

The motivation for optimizing the mixture of gases such that the ratio of plasmas results in an etching rate across the substrate within 1% of the rate of etching at the central portion of the substrate is to improve the uniformity of the etching process which results in a more uniformly etched substrate as taught by Oda et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the etching method of Oda et al in the apparatus of Hongoh.

11. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Jucha et al, 4,874,723 in view of Ikeda et al, US Patent 5,198,755.

Jucha et al was discussed above.

Jucha et al differs from the present invention in that Jucha et al does not teach etching a quartz substrate, such that the rate of etching across the substrate is within 1% of the rate of etching at the central portion of the substrate.

Ikeda et al teaches etching a quartz plate 50. (Figure 5)

The motivation for etching a quartz substrate in the apparatus of Jucha et al is to provide an etching apparatus in which to form the probes taught by Ikeda et al.

The motivation for optimizing the mixture of gases such that the ratio of plasmas results in an etching rate across the substrate within 1% of the rate of etching at the central portion of the substrate is to improve the uniformity of the etching process which results in a more uniformly etched substrate as taught by Ikeda et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to manufacture the probes of Ikeda et al in the apparatus of Jucha et al.

Response to Arguments

12. Applicant's arguments filed February 16, 2006 have been fully considered but they are not persuasive.

In regard to the argument that the cited prior art does not teach that the ratio of the plasmas result in a rate of etching across the substrate is within 1% of the rate of etching at the central portion of the substrate, the Examiner agrees. However, the Examiner notes that such a limitation is not a structural element and has little weight in

an apparatus claim. The limitation has been fully considered by the Examiner. The limitation requires that the apparatus at a minimum be capable of supplying two etching gases to the plasma chamber and that each gas supply is controlled by a controller to maintain a flow rate into the plasma chamber and thus maintain the ratio of the plasmas. If the claimed ratio of the plasma is met, then the desired uniform etching rate is achieved. Any plasma reactor supplied with the claimed gases at the claimed rate will achieve the claimed uniform etching rate. All of the cited apparatus include controllers for controlling the supply of the etching gases to the chamber and are therefore capable of supplying the claimed ratio of gases to form the required ratio of plasmas and thus the uniform etch rate across the surface of the substrate.

In regard to the argument that a SiO_2 film is not a quartz plate, the Examiner disagrees. The term "plate" is broad and includes thin layers of material, i.e. gold plate. Therefore, a SiO_2 film can be considered a quartz plate. Further, any additional layers such as a stop etch layer are not limited or prevented by the open language of the claim.

In regard to the arguments that the plasma and quartz plate are structural elements, and not contents of an apparatus during the operation of the apparatus or materials worked on by the apparatus, the Examiner disagrees. The formation of a plasma is the very purpose of a plasma apparatus. The apparatus performs work on the gas through the application of energy to form the plasma. The plasma will only exist while the apparatus is in operation. Therefore, the limitation in claims 24 and 27 requiring a chamber having a specific type of plasma is an expression relating the

apparatus to contents thereof during an intended operation and as directed by the MPEP 2115 should be of no significance in determining patentability of the apparatus claim, as held in *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Likewise, the quartz plate is supported in the chamber and etched by the plasma formed by the apparatus in the chamber. Therefore, the quartz plate is being worked on by the apparatus, and as held in *In re Young*, 75 F.2d *>996<, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)) inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art teaches the technological background of the invention.

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

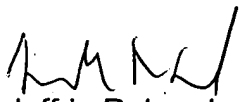
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (6:30 am-6:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jeffrie R. Lund
Primary Examiner
Art Unit 1763

JRL
5/1/06

Ikeda et al

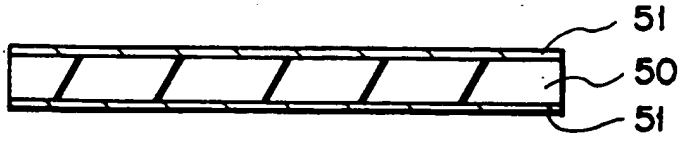


FIG. 5A

Figure 5A-5F
50
11

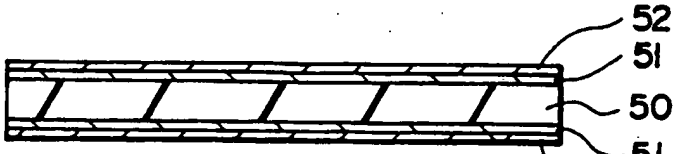


FIG. 5B

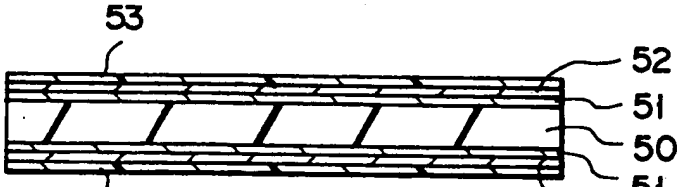


FIG. 5C

2/1/06

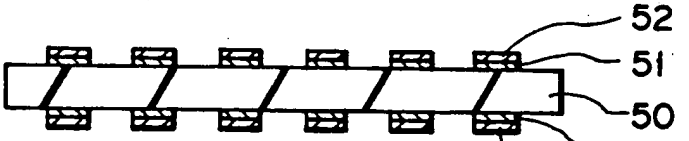


FIG. 5D

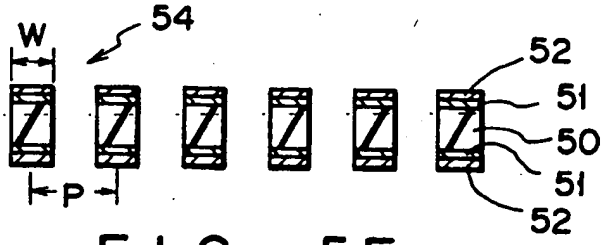


FIG. 5E

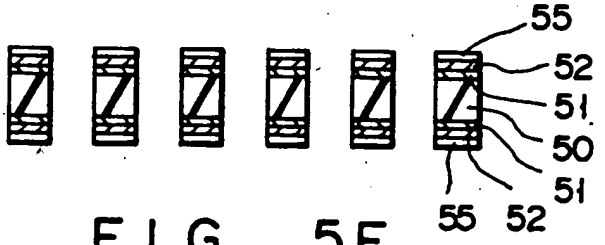


FIG. 5F